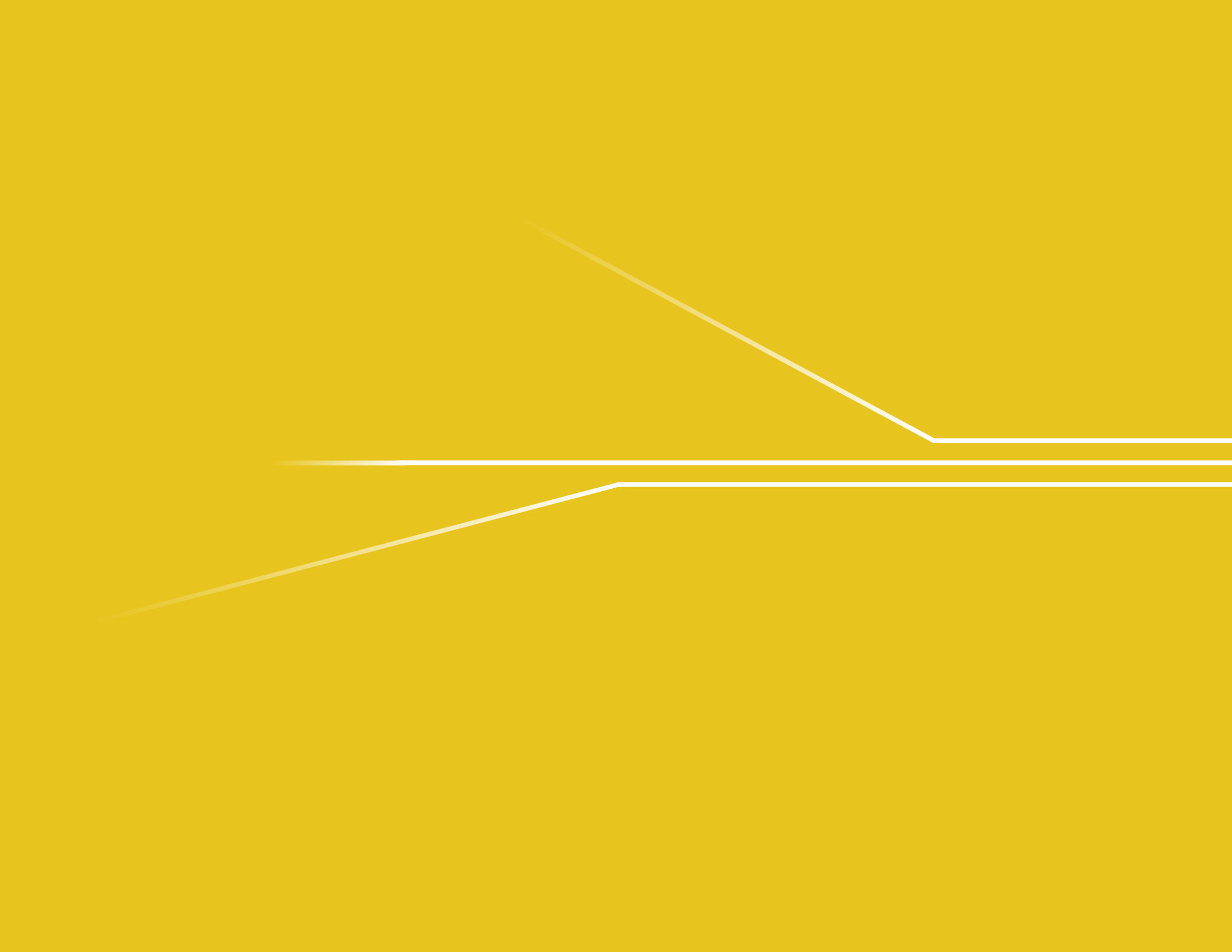


# Groundwater Protection Program

FY 2002 Progress Report







# Table of Contents



Executive Summary - Accelerating Hanford Groundwater Cleanup .....	1
Section 1 - Protecting Hanford Groundwater .....	3
Section 2 - Remediating Hanford Groundwater.....	7
Section 3 - Monitoring Hanford Groundwater.....	9
Section 4 - Developing Science and Technology .....	11
Section 5 - Providing Modeling and Assessments .....	13
Section 6 - Ensuring Public Participation .....	17
Section 7 - Planning for FY 2003.....	18
Section 8 - Preparing for Cleanup Beyond FY 2003.....	19



***Strategic Initiatives to Accelerate Cleanup of the Hanford Site***

# Accelerating Hanford Groundwater Cleanup

Fifty years of nuclear weapons production has resulted in 450 billion gallons (1.7 trillion liters) of liquid waste being released to the ground at the Hanford Site. Some of the associated contaminants have reached the groundwater. Hazardous chemical contaminants include carbon tetrachloride, chromium, and nitrates. Radioactive contaminants include iodine-129, strontium-90, technetium-99, tritium, and uranium.

Currently, about 14% or 80 square miles (207 square kilometers) of Hanford's groundwater has contaminant levels greater than federal and state drinking water standards. Hanford groundwater is not a source of drinking water and does not affect offsite drinking water sources, such as the Columbia River and municipal and private wells. There are, however, possible near shore impacts where Hanford groundwater flows into the Columbia River.

In FY 2002, the U.S. Department of Energy (DOE) created the *Performance Management Plan for the Accelerated Cleanup of the Hanford Site*. The plan draws on recommendations from DOE's environmental management review conducted early in 2002, and on ideas emerging from a yearlong process by the "C3T" (Cleanup, Constraints, and Challenges) Team made up of DOE, U.S. Environmental Protection Agency, Washington State Department of Ecology, and contractor representatives.

Previous groundwater cleanup baselines required too much time, unrealistic levels of funding, and delayed reduction of risk. The Performance Management Plan's baseline calls for eliminating by 2012, rather than 2024, those conditions of highest risk to further contaminate the groundwater, and DOE's environmental management mission at the Hanford Site completed by 2035.

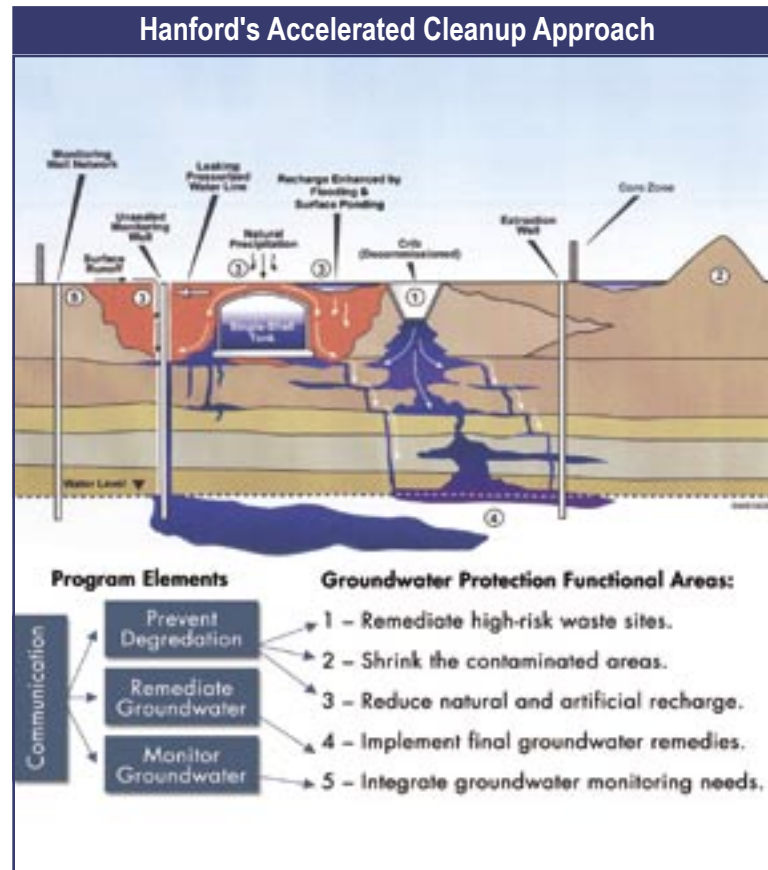
The Performance Management Plan is composed of six initiatives, driven in part by the need to protect Hanford's groundwater. In each case, the initiatives identify work required by the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement) and invest additional resources in those projects to achieve early completion. The Groundwater Protection Program was established in mid-FY 2002 to champion Initiative 6—Accelerate Groundwater Cleanup and Protection.

Derived from the previous Groundwater/Vadose Zone Integration Project, the Groundwater Protection Program, managed by Central Plateau Remediation Project contractor, Fluor Hanford, is focused on specific cleanup activities, many of which take place in the Central Plateau. A 75-square-mile (194-square-kilometer) area near the middle of the Hanford Site, the Central Plateau is home to the 200 East and 200 West Areas. Facilities used for producing nuclear materials, as well as Hanford's 177 underground tanks, used for storing high-level radioactive waste, are located in the 200 Areas.

Groundwater Protection Program team members—including staff from Fluor Hanford, CH2M HILL Hanford Group, and the Pacific Northwest National Laboratory (PNNL)—work closely with DOE and Hanford regulators to characterize, protect, remediate, and monitor Hanford

groundwater. The program coordinates and performs scientific research and development to support decision-making activities at Hanford. It also manages Hanford's modeling and assessment capabilities aimed at cleaning up the groundwater.

Throughout its work, the Groundwater Protection Program remains committed to providing opportunities for Hanford's community of interested people to be involved in program decision-making. Trust and support from this group are vital to rapid progress and program success.



## FY 2002 ACCOMPLISHMENTS

- Operated Hanford's five pump-and-treat systems at nearly full capacity, processing more than 317 million gallons (1.2 billion liters) of groundwater.
- Removed 1,384 pounds (628 kilograms) of carbon tetrachloride from the soil between April and September through the soil vapor extraction process.
- Installed the majority of the third and final phase of In-Situ Redox Manipulation technology, used to convert chromium in Hanford groundwater near the 100 Area.
- Sampled 650+ Hanford groundwater monitoring wells.
- Completed fieldwork to identify trans-uranic waste sites at Hanford.
- Updated Hanford's Science & Technology Roadmap.
- Completed an initial assessment of Hanford contaminants to evaluate remedial alternatives.



## Protecting Hanford Groundwater

Several waste sites pose a high risk to the Hanford vadose zone (the area between the ground's surface and the top of the water table) and groundwater (the supply of fresh water found in layers beneath the earth's surface). This is due to large mobile contaminant inventories and underground plumes. Some of the plumes have entered the groundwater.

Other high-risk waste sites have little groundwater contamination. Early action may prevent or significantly reduce further contamination of the vadose zone and the groundwater at these sites. Characterizing waste sites is necessary before they can be remediated.

### Characterizing PFP Soil

In FY 2002, the Groundwater Protection Program completed a field investigation of areas where plutonium-bearing wastes from the Plutonium Finishing Plant (PFP), in the Central Plateau's 200 West Area, were disposed to the soil. Plutonium was not found to be present at levels that would designate these as transuranic waste sites. Fluor Hanford, together with the U.S. Department of Energy (DOE) and regulators (U.S. Environmental Protection Agency and Washington State Department of Ecology), will use field investigation information gathered to decide the most effective ways to clean the waste sites.



The Groundwater Protection Program also completed the first phase of an investigation aimed at identifying, at depths of 25 feet (7.6 meters) or less, locations of unrecorded carbon tetrachloride releases to the soil around PFP. The second phase of this investigation, planned for FY 2004, will use the results from the first phase to identify probable locations to test for contamination that has moved deeper into the vadose zone. Final results should help determine why the current carbon tetrachloride groundwater plume area does not match data from known or suspected disposal sites.

Where there were known releases of carbon tetrachloride, a soil vapor extraction system was used from April - September 2002 to remove the substance from the soil before it reached Hanford groundwater. Since 1991, soil vapor extraction has removed more than 171,478 pounds (77,781 kilograms) of carbon tetrachloride from the Hanford vadose zone. During the process, extraction wells are drilled, creating a path for carbon tetrachloride to be drawn to the earth's surface and captured under a vacuum by carbon filters.

## Characterizing Soil Beyond the Central Plateau Core Zone

In FY 2002, the Groundwater Protection Program initiated a feasibility study to address waste sites outside the Central Plateau Core Zone including the Gable Mountain Pond, B Pond, and 200 North Area. These areas will be maintained in long-term stewardship. Early remediation and closure of associated sites will

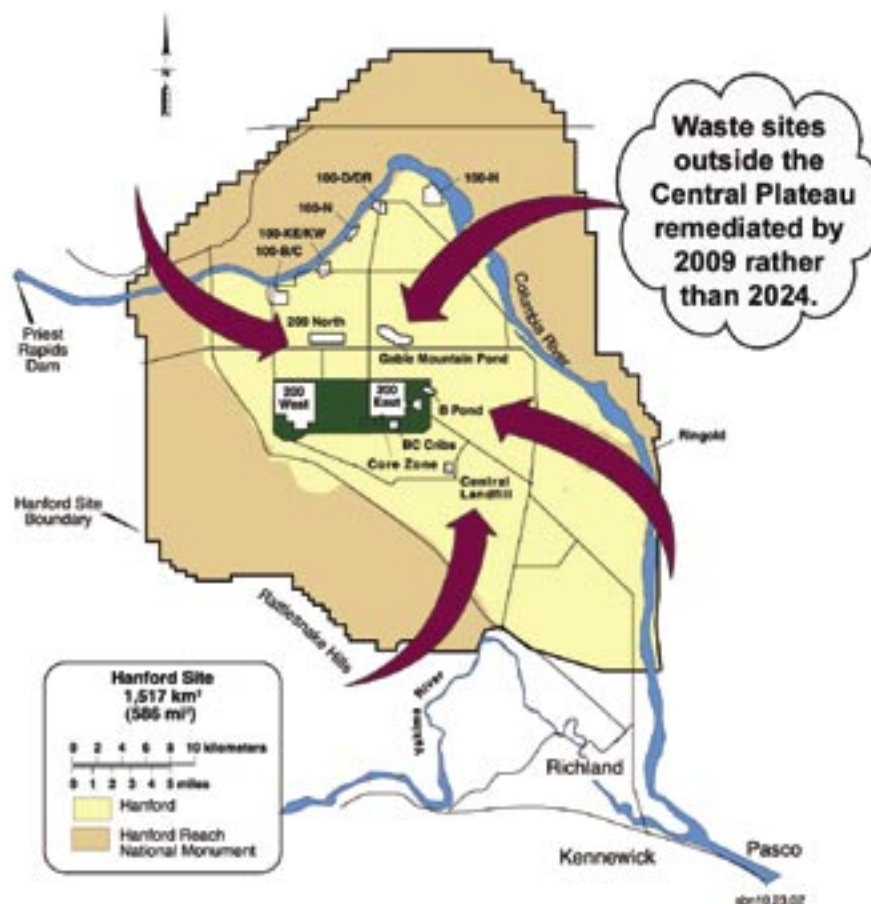
virtually eliminate all surface contamination and reduce the rates at which existing contaminants may enter the groundwater.

## Tank Farm Vadose Zone Project Interface

The Groundwater Protection Program interfaces with the Tank Farm Vadose Zone Project, managed by the DOE Office of River Protection and coordinated by CH2M HILL Hanford Group. In response to past waste leaks, the Tank Farm Vadose Zone Project

characterizes soil around single-shell tanks, recommends interim actions to remediate impacts from those leaks, and implements approved measures.

In FY 2002, the Tank Farm Vadose Zone Project drilled three boreholes in the TX Tank Farm, where significant leaks are suspected to have occurred. Laboratory tests of soil samples taken above the groundwater are being conducted, and results will be published in a public report.

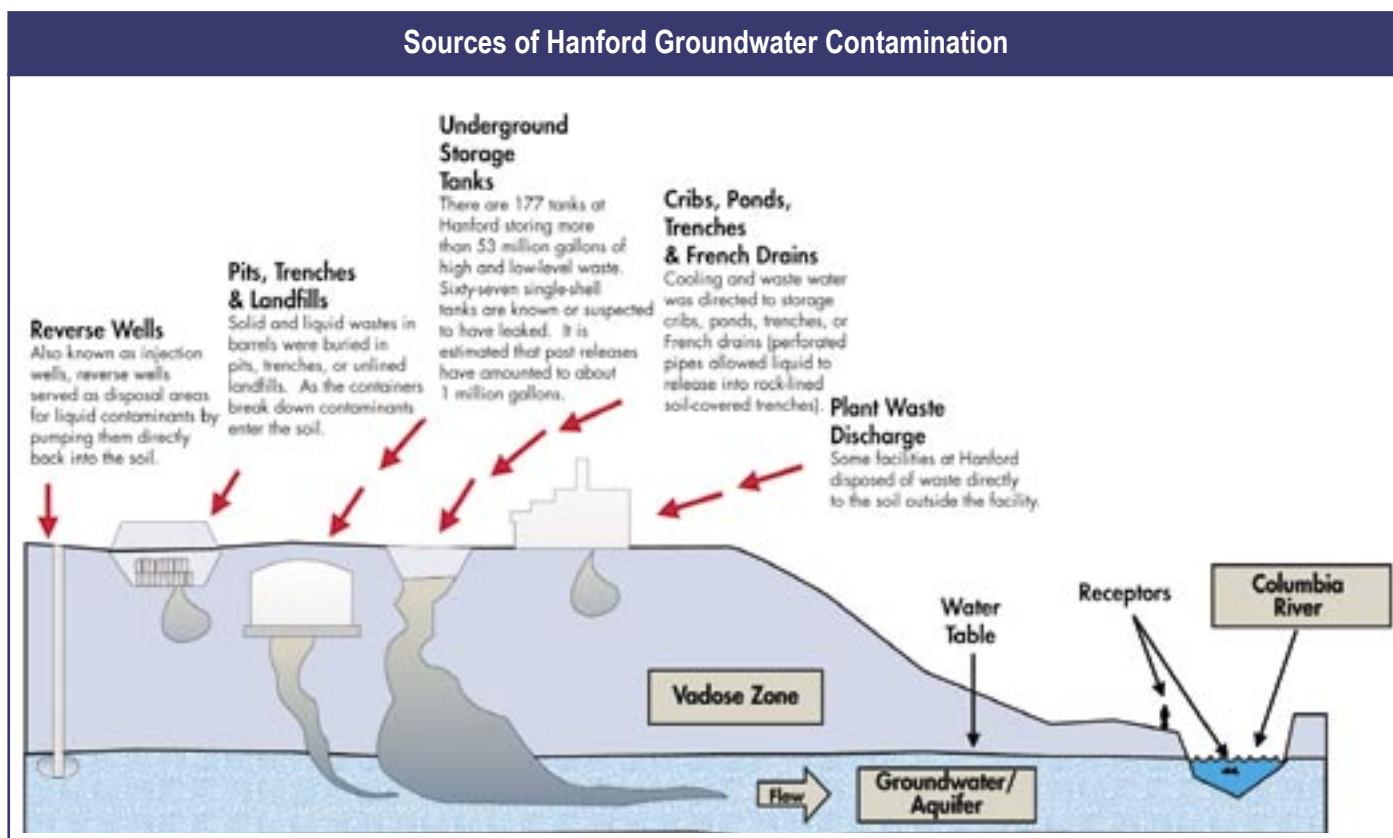




Fixing or abandoning leaking water lines reduces recharge.

The Tank Farm Vadose Zone Project completed a field investigation at the S and SX Tank Farms that showed leaking waterlines to be a major cause of tank waste contamination reaching groundwater near Tank SX-115. A report was issued, satisfying Tri-Party Agreement Milestone M45-55-T01.

Aging waterline testing in and around single-shell tank farms was completed in FY 2002. As a result, leaking lines were cut and capped, eliminating a major contributor to the further migration of leaked tank wastes. Berms and gutters were also added around all single-shell tank farms, to eliminate the run-on of water to the tank farms.





Early in FY 2002, DOE's Office of Environmental Management approved the 2001 version of the *Hanford Immobilized Low-Activity Waste Performance Assessment*. DOE also revised the *Hanford Low-Level Waste Disposal Authorization Statement* to allow the construction and subsequent operation of lined trenches to receive waste packages.

## Vadose Zone Geophysics

The Vadose Zone Borehole Geophysics Program provides borehole logs and reports of radionuclide baseline characterization data for 200 Area waste site boreholes near liquid waste effluent discharge sites. These sites include evaporation ponds, contamination cribs, and specific retention trenches. New wells and boreholes are also logged by this program.



A Cone Penetrometer, housed in a field truck, pushes rods deep into the earth to collect representative soil samples.

## Groundwater Geophysics Monitoring

The Groundwater Geophysics Monitoring Program provides borehole logs and reports of radionuclide contamination data in existing and new groundwater monitoring wells on the Central Plateau. These data are included in comprehensive waste site reports and the annual Hanford groundwater monitoring report.

## Using Advanced Technologies

The Groundwater Protection Program employs a variety of technologies that help program staff members better understand the types, amounts, and locations of contaminants in the vadose zone and groundwater—which helps remediation efforts.

Two of these technologies, the Cone Penetrometer and the Geoprobe, use specially equipped vehicles to drive a small-diameter pipe into the ground and collect sediment or vapor samples. Neither produces wastes associated with drilling.

Other specially designed systems detect and quantify natural and manmade radionuclides in the Hanford vadose zone. Two spectral gamma-logging systems and a radionuclide assessment system collect data by inserting detectors into boreholes.



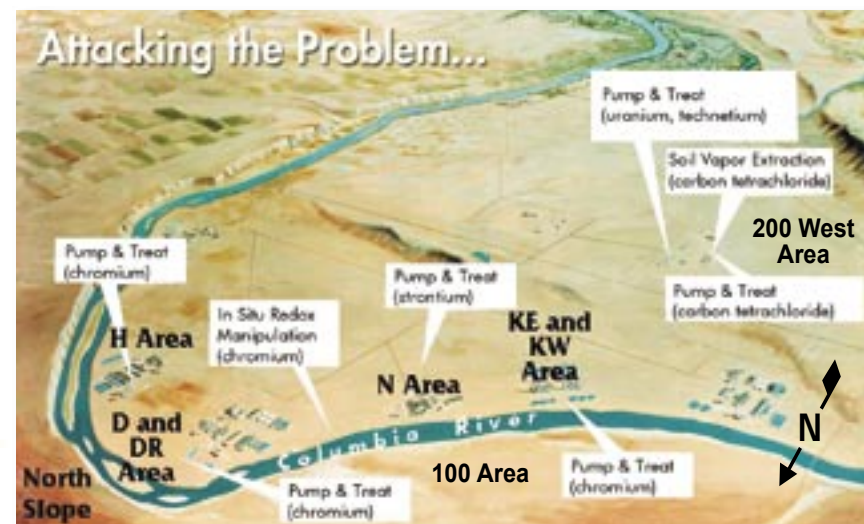
Hanford worker operates a Geoprobe, used to characterize subsurface soil.

The Groundwater Protection Program also uses ground-penetrating radar to locate subsurface features, such as pipelines, before conducting drilling. A new technology, that combines the benefits of the Cone Penetrometer with conventional drilling, is being tested. The technique will continue to be demonstrated in FY 2003 to further determine its usefulness in Hanford characterization activities.

## Remediating Hanford Groundwater

Hanford groundwater and the Columbia River are important regional resources. Yet Hanford groundwater is the primary pathway for contaminants from past nuclear materials production to reach the Columbia River. The goal of groundwater cleanup is to restore groundwater to its intended beneficial use—protecting human health, the environment, and the Columbia River.

In FY 2002, the Groundwater Protection Program operated five pump-and-treat systems to clean up Hanford groundwater. A pump-and-treat system pumps contaminated water from an extraction well to the surface where contaminants are removed via selected treatment technology. The treated water is returned to the groundwater at an upstream location, which flushes contaminated water toward the pump-and-treat system for extraction.



### Pump-and-Treat Systems 200-ZP-1 and 200-UP-1

Two pump-and-treat systems are operated in the 200 West Area—200-ZP-1 and 200-UP-1. During FY 2002, five extraction wells at 200-ZP-1 successfully contained high concentration portions of a carbon tetrachloride ( $\text{CCl}_4$ ) plume, removing over 2,315 pounds (1,050 kilograms) from the aquifer.  $\text{CCl}_4$  was a solvent used in the plutonium extraction process and was disposed to the soil after it was no longer useful. The overall size of the  $\text{CCl}_4$  plume is 4.2 square miles (11 square kilometers)—with high concentrations making up only 10% of the area, but about 60% of the total contaminant mass in the groundwater.

Two extraction wells at 200-UP-1 are successfully containing uranium and technetium-99 groundwater plumes, having removed 58.2 pounds (26.4 kilograms) and 0.5 ounces (14.5 grams) of contamination, respectively, in FY 2002. Greater success has been achieved at removing technetium-99 than uranium. Uranium tends to adhere to soil particles, making it more difficult to extract from the aquifer. A second extraction well was added to the system in FY 2002 to supplement and enhance removal of groundwater contamination.

## Pump-and-Treat Systems 100-HR-3, 100-KR-4, 100-NR-2

The Groundwater Protection Program operates four pump-and-treat systems in the 100 Area along the Columbia River near several formerly active nuclear reactors. Two are located at 100-HR-3—one in the D Area, the other in the H Area. Another is located at 100-KR-4 in the KE/KW Area. These three pump and treats are remediating hexavalent chromium contamination in groundwater. Pump-and-treat system 100-NR-2 in the N Area is removing radioactive strontium-90 from groundwater.

Chromium was used as a corrosion inhibitor in reactor piping and disposed to the soil after use. From the soil, it percolated to the groundwater. The greatest hexavalent chromium con-



FY 2002 system upgrades included adding an extraction well and an injection well to pump-and-treat 100-KR-4.

cern is its potentially toxic effect on salmon fry, as they first emerge from their eggs.

The D Area pump-and-treat system's four extraction wells removed about 63.3 pounds (28.7 kilograms) of hexavalent chromium during FY 2002, continuing to capture most of the high concentrations in the plume. Two of the wells were new—added during the fiscal year, because fresh characterization data showed the plume to be larger than originally thought.

The H Area pump-and-treat system's five extraction wells removed about 7.3 pounds (3.3 kilograms) of hexavalent chromium during FY 2002, nearing a 22 micrograms per liter remediation goal for Columbia River salmon habitat protection. Monitoring results show a combination of pump-and-treat and source-control actions to be effective in returning 100-H Area groundwater to future beneficial use.

The KE/KW Area pump-and-treat system's eight extraction wells removed 77.8 pounds (35.3 kilograms) of hexavalent chromium in FY 2002. One of the extraction wells was new—added during the fiscal year to improve “capture and containment” of the plume and meet remedial action objectives.

The N Area pump-and-treat system's three extraction wells treated about 0.2 Curies of strontium-90 during FY 2002, while an estimated 1.8 Curies were eliminated by natural radioactive decay. Strontium-90 adheres to

soil particles and is very difficult to extract. As a consequence, alternate technologies are being evaluated that may more effectively remediate the strontium-90 in this area.

FY 2002 monitoring results from the B/C and F Areas indicate that completed source-control actions may be sufficient to return the groundwater to a beneficial use status without active groundwater remediation, although continued monitoring will be necessary to confirm this.



As hexavalent chromium passes through the ISRM Barrier, it is changed to a less mobile, less toxic trivalent form of chromium, protecting the Columbia River.

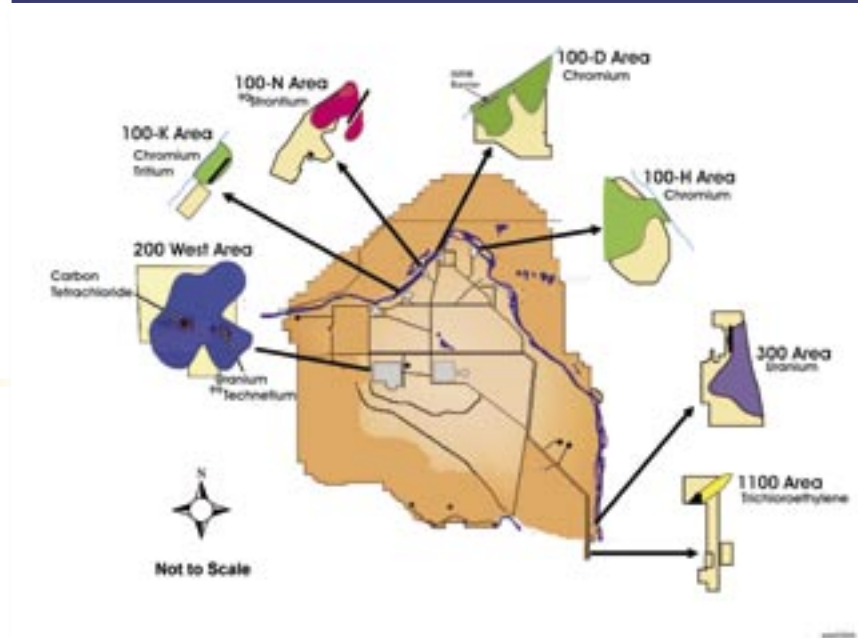
## In-Situ Redox Manipulation

In-Situ Redox Manipulation (ISRM) is being used to treat and prevent hexavalent chromium from reaching the Columbia River in the 100-D Area. A 2,230-foot (680-meter) permeable barrier is being formed through a series of wells in which treatments are conducted via chemical injections and extractions. As the hexavalent chromium passes through the barrier, it is changed to a less mobile, less toxic trivalent form of chromium. In FY 2002, seventeen wells were treated, leaving only five of the sixty-six planned wells to be treated.



## Monitoring Hanford Groundwater

### Hanford Site Groundwater Contaminants



Integrated with the Groundwater Protection Program, the Hanford Site Groundwater Monitoring Project is led by the Pacific Northwest National Laboratory. The project seeks to:

- Detect effects to the groundwater from operating and past practice waste sites.
- Determine the nature and extent of groundwater contamination so appropriate actions can be taken.
- Assess the effectiveness of groundwater cleanup activities.
- Verify Hanford Site contaminants are not present in offsite groundwater.

In FY 2002, 653 monitoring wells were sampled at least once on the Hanford Site to determine distribution and movement of contaminants. Analyses were run for 913 tritium samples, 626 carbon tetrachloride samples, 599 technetium-99 samples, 568 hexavalent

chromium samples, 234 iodine-129 samples, 294 strontium-90 samples, and 550 uranium samples.

## RCRA Activities

The Resource Conservation and Recovery Act of 1976 (RCRA) regulates facilities used to treat, store, or dispose of hazardous waste. At Hanford, the law applies to sites that contained hazardous or mixed (hazardous and radioactive) waste. RCRA requires groundwater monitoring beneath these sites. Monitoring was performed at 24 RCRA sites during FY 2002. Seven sites were monitored under assessment programs, and two were monitored under final-status corrective action. The monitoring provided no evidence of new contamination from fifteen sites in the detection programs. Two new RCRA monitoring wells were drilled during the year.

## CERCLA Activities

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) regulates cleanup of waste sites that were active before RCRA took effect. It pertains to sites where radioactive or hazardous waste was disposed or leaked and also requires groundwater monitoring, where appropriate. Monitoring was performed at eleven CERCLA groundwater operable units and five other liquid or solid waste sites during FY 2002. Three new wells associated with operable unit monitoring were installed. An additional 23 wells were drilled for groundwater remediation and

associated monitoring in the 100-HR-3 and 200-UP-1 operable units.

During the latter half of FY 2002, a team of U.S. Department of Energy, U.S. Environmental Protection Agency, Washington State Department of Ecology, and Hanford contractor staff participated in a strategic planning process, successfully integrating 200 West Area groundwater-monitoring requirements for RCRA, CERCLA, and the Atomic Energy Agency. A similar approach is being implemented for the 200 East Area.



Hanford crews install a borehole using an auger drill.



Technicians sample a monitoring well for groundwater contaminants

## FY 2002 Monitoring Results

Monitoring results:

- Confirmed that the tritium plume emanating from the 200 East Area continued to recede away from the City of Richland and its water supply wells—partly due to the cessation of contaminated liquid discharges containing tritium, also due to the radioactive decay of tritium.
- Confirmed the performance of natural attenuation for trichloroethylene in groundwater beneath the Horn Rapids Landfill near the City of Richland.
- Remained within permit limits at the 400 Area Process Ponds, state-approved Land Disposal Site, and Treated Effluent Disposal Facility. At the Solid Waste Landfill, specific conductance, pH, chloride, sulfate, and chloroform bacteria exceeded background threshold levels in one or more samples.

Other monitoring results and project information can be found in *Summary of Hanford Site Groundwater Monitoring for Fiscal Year 2002* at <http://groundwater.pnl.gov/reports/gwrep02/start.htm>

# Developing Science & Technology

---



The goal of the Science & Technology Project is to coordinate and perform scientific research to support Hanford remediation decision-making activities. The Science & Technology team conducts focused, Site-specific investigations funded by the U.S. Department of Energy (DOE) and coordinates investigations by the DOE Environmental Management Science Program.

## Science & Technology Roadmap

One of the project's key planning tools is the Science & Technology Roadmap. Through the process of roadmapping, problem holders—such as DOE, regulators (U.S. Environmental Protection Agency and Washington State Department of Ecology), tribal governments, remediation contractors, and other stakeholders—come together with problem solvers—such as scientists and engineers from DOE's national laboratories and universities—to define problems and establish solution paths.

During FY 2002, input from two workshops helped update the Science & Technology Roadmap. The update reflected completed work,





Hanford scientist samples solutions during vadose zone transport field experiment.

addressed comments from the National Academy of Sciences/National Research Council, and added the soil and groundwater remediation technical element. Insertion of the remediation technical element identified research and technology development activities aimed at accelerating Hanford Site cleanup.

## Strontium-90 and Uranium Investigations

Several Science & Technology investigations conducted in FY 2002 resulted in new information about how wastes from the B-BX-BY Tank Farm move through the vadose zone. Findings describe how strontium-90 and

uranium move through the subsurface of the soil. They also provide geochemical models to predict future behavior of the contaminants.

Several DOE national laboratories and user facilities supported this investigation, and results from the DOE Environmental Management Science Program were incorporated into an Office of River Protection Tri-Party Agreement milestone.

## Carbon Tetrachloride Models

Characterization and remediation technologies are vital to carbon tetrachloride cleanup in the 200 West Area. Uncertainty about the inventory and form of carbon tetrachloride remaining in the vadose zone and groundwater limit the effectiveness of current cleanup actions. Science & Technology is developing data to improve conceptual carbon tetrachloride site models.

During the first year of a three-year effort, the Science & Technology team measured carbon tetrachloride properties required for simulating the behavior of existing fluids in 200 West Area soil. These results will help plans to accelerate characterization and cleanup of the vadose zone and groundwater carbon tetrachloride plumes.

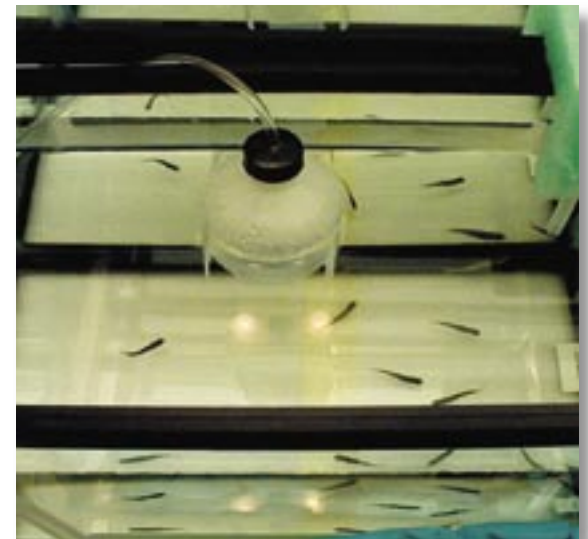
## Vadose Zone Field Experiment

Results from an FY 2002 field experiment will be used to evaluate the impacts of vadose zone sediment layers that may control the movement of technetium-99 and other key con-

taminants. The controlled field experiment of infiltration and redistribution of water and dilute tracers was completed at a Hanford field site. Results are being evaluated with a simulation model to improve predictions of flow and transport in the vadose zone.

## Biological Uptake Studies

Key information about how radionuclides are absorbed by aquatic species is needed to improve risk assessments at the Hanford Site. In FY 2002, the Science & Technology team performed laboratory experiments to determine the uptake of technetium-99 by rainbow trout and periphyton (an aquatic plant). Results are being used to generate contaminant uptake models for the System Assessment Capability and other risk assessment tools.



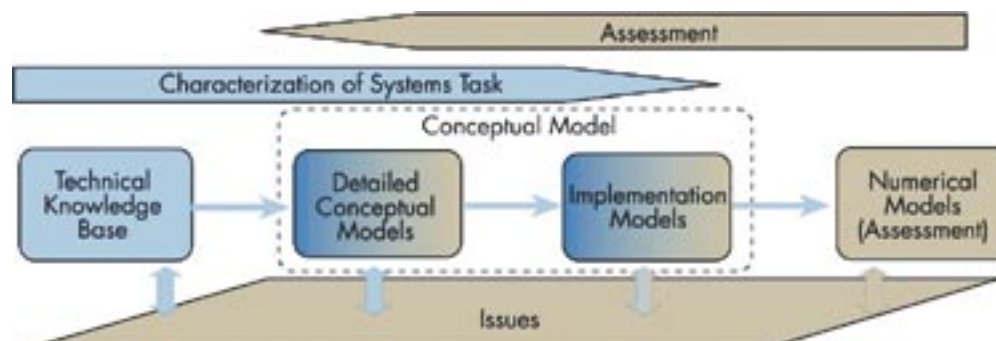
Rainbow trout represent juvenile "threatened" Hanford Reach steelhead in water uptake experiments involving technetium-99.



## Providing Modeling & Assessments

Understanding contaminant release, distribution, and movement is vital to addressing contaminant concerns on the Hanford Site, identifying impacts to human health and the environment, and making

decisions about remediation and long-term stewardship. The Groundwater Protection Program manages the resources required to provide this information.



### Characterization of Systems

The Characterization of Systems effort within the Groundwater Protection Program:

- Facilitates the development of consistent conceptual models for the Hanford Site.

- Consolidates, maintains, and communicates technical baseline information and data as a foundation for organizing technical issues and developing assessment-specific data packages.
- Promotes the coordination and integration of field characterization work and assessment modeling approaches.

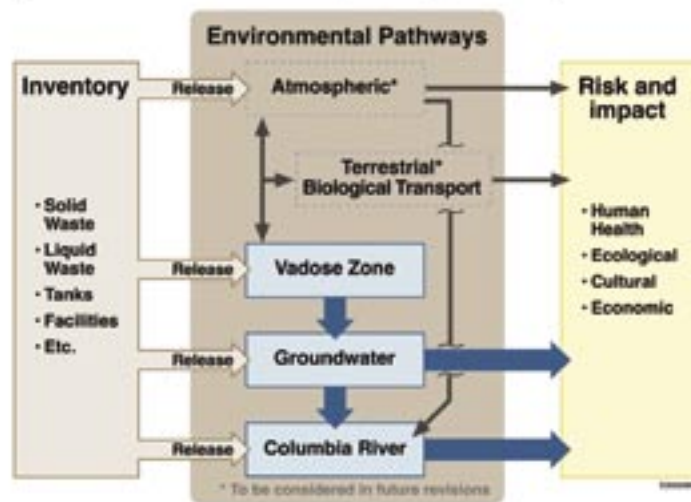
In FY 2002, the project team continued to refine standard tools and methodologies promoting the development of complete and consistent conceptual models. As a part of this effort, a manuscript—detailing the U.S. Department of Energy's efforts to adapt and implement features, events, and processes methodology used in performance assessments of nuclear waste disposal systems—was completed and submitted to the *Journal of Stochastic Environmental Research and Risk Assessment*.

## Risk Assessments

The Groundwater Protection Program provides cumulative impact assessments, presenting a site-wide context for future decisions regarding individual waste sites. These analyses allow users to explore potential impacts of remediation alternatives. They also provide a means for visualizing how impacts from various types of Hanford waste might change over time.

In FY 2002, the Groundwater Protection Program used the System Assessment Capability to complete an initial assessment of Hanford contaminants to evaluate remedial efforts. An

## System Assessment Capability Conceptual Model



integrated system of computer models and databases, the capability enables users to model the movement and fate of Hanford contaminants through the vadose zone, groundwater, and Columbia River and assess the impacts of those contaminants on human health, the environment, the local economy, and cultural practices. The Pacific Northwest National Laboratory coordinates the System Assessment Capability Project for the Groundwater Protection Program.

The FY 2002 effort demonstrated that an assessment for a broad range of risks could be conducted for all Hanford waste sites containing radiological and hazardous chemical contaminants. User guides developed in conjunction with the effort will facilitate the training of new users, improve communications with

regulators (U.S. Environmental Protection Agency and Washington State Department of Ecology), stakeholders, and tribal governments, and allow peer reviewers to better understand how the capability functions.

Results of the initial assessment conducted in FY 2002 indicate there are no current or predicted future adverse impacts to the Columbia River from Hanford contaminants. In fact, the Hanford Reach stretch of the Columbia River has been deemed "Class A Excellent Water Quality" by the State of Washington (WAC 173-201A) and should remain so during Hanford cleanup and closure.

The System Assessment Capability is continually being updated and improved to reduce uncertainty and more accurately reflect Site conditions and potential impacts to onsite groundwater and the Columbia River. In FY 2003, a composite analysis will be undertaken to evaluate in greater detail combined impacts from planned Hanford Site cleanup and closure. A final updated composite analysis will be completed by the end of FY 2004, in accordance with DOE Order 435.1.

The System Assessment Capability Report can be accessed at:

<http://hanford.gov/cp/gpp/modeling/sac.cfm>.





## Environmental Databases

The Groundwater Protection Program manages Hanford environmental databases to ensure that site-wide users have easy access to this wealth of technical information and data about the Site.

The Virtual Library provides a user-friendly, web-based resource of Hanford environmental data to Hanford staff members. Through the use of stand-alone modules, users can quickly retrieve, graph, and generate reports with data contained in the electronic library.

In FY 2002, several additions were made to the Virtual Library, including the addition of two new modules and two “orphaned” modules. One of the new modules contains data for groundwater, soil, soil gas, air, surface water, and miscellaneous material samples captured in the Hanford Environmental Information System database. The other new module contains data from the System Assessment Capability Rev. 0 modeling run. This module helps capability developers identify issues that must be addressed in future revisions.

“Orphaned” modules housed in the Virtual Library are databases no longer maintained by Hanford contractors. They contain useful information that would be lost unless given a home. Of the “orphaned” databases added in FY 2002, one provides data on the effluent volume to soil disposal sites for the 200 East and 200 West Areas, while the other contains particle size and distribution data for soils on the Hanford Site.

In addition to the Virtual Library, the Groundwater Protection Program manages several environmental databases, including:

- **Hanford Environmental Information System (HEIS).**
- **Hanford Well Information System (HWIS).**
- **Hanford Geographic Information System (HGIS).**
- **Waste Information Data System (WIDS).**

HEIS is a consolidated set of automated resources that effectively manage the data collected during environmental monitoring and restoration of the Hanford Site. During FY 2002, HEIS was modified so users could more easily perform statistical analyses.

Reliable information about Hanford wells is necessary to support the program’s groundwater management activities. HWIS provides a system to assist long-term well management by providing a database that manages information ranging from drilling to decommissioning. During FY 2002, HWIS was re-engineered to provide better quality

traceable data. Web-based access to Hanford Site groundwater data is currently being developed for regulators, tribal nations, and stakeholders.

HGIS contains data about waste sites, wells, contaminated zones, administrative units, and buildings, as well as other traditional topographic and thematic information used for long-term management. In FY 2002, data associated with more than 100 land survey jobs—performed in support of Site characterization, remediation, and mapping efforts, as well as data concerning more than 420 additional wells—were added to the database. The Hanford Site Atlas, an activity within HGIS, was revised and published during FY 2002, along with the production of a large number of special map requests.

WIDS provides a system to assist long-term waste management and environmental restoration planning by supplying validated reliable information about waste sites. The system is used to track Site investigation, remediation, and closure-action activities under the Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement).

During FY 2002, WIDS documented closure of 23 waste sites. In addition, the Tri-Parties agreed that 18 sites in WIDS did not require cleanup. Further, a group of 71 individual releases in the tank farms were merged into eight consolidated soil sites based on tank farm boundaries. As part of the Hanford Site



In-Situ Redox Manipulation workers at barrier wells.

Waste Management Units Report (a Tri-Party Agreement commitment), an Appendix C update was prepared and posted on-line for public access.

Other databases supporting specific activities within the Groundwater Protection Program were also maintained in FY 2002, including pump-and-treat project-specific databases and the In-Situ Redox Manipulation project-specific database.

## Ensuring Public Participation

Key to successful Hanford cleanup is providing information resources and public involvement opportunities to Hanford's community of interested people. This large, passionate, diverse, and geographically dispersed community is united in its desire to protect the Columbia River and have a voice in Hanford's future.

### Open Meetings

In FY 2002, informal open meetings—held the first Monday of every month—gave the public, tribal governments, stakeholders, regulators (U.S. Environmental Protection Agency and Washington State Department of Ecology), the U.S. Department of Energy, and program staff an opportunity to discuss and resolve issues and identify upcoming events. Meeting minutes were issued to more than 200 individuals and organizations on the Groundwater Protection Program distribution list and posted on the program's website.

### Sessions & Workshops

The Groundwater Protection Program provided regular information in FY 2002 to the Hanford Advisory Board and its subcommittees. The program also held several information sessions and workshops with regulators, tribal governments, and other interested parties to discuss and obtain input concerning specific program events and activities.

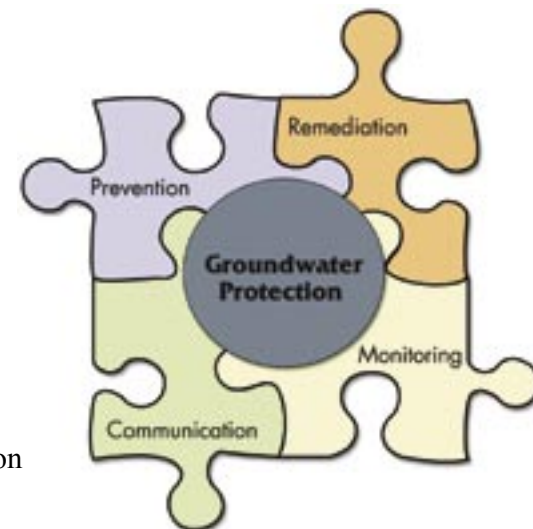
### Reports

Groundwater Protection Program annual reports describe significant accomplishments and plans for the future. The reports are distributed widely and are available via the Internet. Hanford's aggressive master plan for cleaning and protecting groundwater is currently under development. *Hanford's Groundwater Management Plan: Accelerated Cleanup and Protection* will be available on the program website in FY 2003.

### Website

The Groundwater Protection Program Internet website contains information about the program's missions, a calendar of upcoming events, and links to a variety of resources. Reflecting the FY 2002 transition of program management from Bechtel Hanford to Fluor Hanford, the website experienced major revisions in FY 2002. The new website can be found at:

<http://www.hanford.gov/cp/gpp/>





# Planning for FY 2003

## FY 2003 Budget

The Groundwater Protection Program team includes staff from Fluor Hanford (FH), CH2M HILL Hanford Group (CH2M HILL), and the Pacific Northwest National Laboratory (PNNL). To ensure progress is as rapid as possible, they work closely with each other, as well as the U.S. Department of Energy Richland (RL), the U.S. Department of Energy Office of River Protection (ORP), Hanford regulators (U.S. Environmental Protection Agency and Washington State Department of Ecology), tribal governments, stakeholders, and the general public.

Through an independent requirements contract with the S.M. Stoller Corporation, the Geophysics Program provides key data in support of both vadose zone and groundwater environmental programs. Data provided by the Geophysics Program is key in determining distribution of radionuclide contamination in the vadose zone and impacts to groundwater underlying the Hanford Site. Geophysics data support key environmental cleanup and closure decisions.

The following table includes major FY 2003 sources of funding in support of the Groundwater Protection Program, as of January 2003.



## Funding in Support of the Groundwater Protection Program\* (millions of dollars)

Function	FY 2003 Funding	Responsible Contractor	Responsible DOE Office
<b>Groundwater Cleanup</b>			
Groundwater Monitoring	\$1.9	FH	RL
Well Installation & Maintenance	\$0.8	FH	RL
100 Area Pump and Treats and ISRM	\$7.1	FH	RL
200 Area Pump and Treats and Vapor Extraction	\$3.6	FH	RL
Artificial Recharge & Well Decommissioning	\$1.5	FH	RL
Groundwater & Vadose Zone Monitoring	\$10.6	PNNL	RL
<b>River Protection Project Field Activities</b>			
River Protection Project Vadose Characterization	\$8.0	CH2M HILL	ORP
ILAW Performance Assessment	\$2.0	CH2M HILL	ORP
<b>Waste Site Characterization</b>			
200 Area and 618-10/11 Waste Site Characterization	\$8.7	FH	RL
ER 200 Area Borehole Logging	\$1.0	Stoller	RL
Surface Environmental Surveillance Program/Columbia River Monitoring	\$0.4	PNNL	RL
Science & Technology	\$4.6	PNNL	RL
System Assessment Capability	\$1.9	PNNL	RL
Technical Integration	\$5.0	FH	RL
GPP Management & Support	\$7.3	FH	RL

\*As of January 2003

# Preparing for Cleanup Beyond FY 2003



Protection of Hanford's groundwater requires an aggressive plan to limit and control the migration of contaminants already in the soil and the groundwater. The U.S. Department of Energy—through its primary management contractor, Fluor Hanford—has developed a plan, in consultation with the U.S. Environmental Protection Agency and the Washington State Department of Ecology, to accelerate cleanup. This will return groundwater to its beneficial use, where practicable, or at least prevent further degradation.

The previous baseline showed remediation beginning in 2008 and extending to 2024. New accelerated master schedules, illustrated in *Hanford's Groundwater Management Plan: Accelerated Cleanup and Protection*, feature a baseline beginning in 2004 and completed in 2012.

Specific results expected using the accelerated plan for cleanup include the following:

1. **Remediate High-Risk Waste Sites** – Clean up waste sites that

pose the highest risk to groundwater by 2011, rather than 2024.

2. **Shrink the Contaminated Areas** – Reduce the contaminated surface area (so it can be released for other purposes) by 2009, rather than 2023.
3. **Reduce Recharge** – Reduce the transport of contaminants to groundwater from natural and artificial recharge by 2012, rather than 2024.
4. **Remediate Groundwater** – Implement final remedial actions at pump-and-treat sites by 2006, rather than 2016.
5. **Monitor Groundwater** – Determine the groundwater monitoring needs for long-term stewardship of the Central Plateau and evaluate new technologies that may be more effective.

Specific work scope concluded by the end of FY 2006, according to *Hanford's Groundwater Management Plan: Accelerated Cleanup and Protection*, will:

- Remediate 54 waste sites.
- Decommission 420 high-risk wells.
- Complete four Records of Decision for waste site remediation.
- Complete an integrated monitoring system for at least 60 new wells.
- Initiate implementation of final groundwater remedial actions for 200-UP-1, 100-HR-H, and 100-NR-2.
- Complete waterline infrastructure upgrades to reduce recharge.

*Hanford's Groundwater Management Plan: Accelerated Cleanup and Protection* will be updated periodically and will be used to document further project status. The plan may be found in the Groundwater Protection Program website library at:

<http://www.hanford.gov/cp/gpp/library/library.cfm>





# Groundwater Protection Program

---

1200 Jadwin, 3rd Floor  
Richland, WA 99352

You may reach us at:  
<http://www.hanford.gov/cp/gpp/>  
(509) 373-3871  
or by writing

**Fluor Hanford**

P.O. Box 1000 - MISN E6-35  
Richland, WA 99352

